

# OPENFORIS INITIATIVE



## Enabling multi-purpose forest assessment, monitoring, and reporting

Danilo Mollicone

**The 3<sup>rd</sup> PNGFA National Forest Inventory Workshop**

**“Development of methodologies for the first National Forest Inventory in Papua New Guinea”**

20<sup>th</sup> to 22<sup>nd</sup> May 2014

Open Foris

# Buzz words

Sustainable forest management

Planning & policy development (NFPs)

***Growing demand for country support in  
obtaining accurate information on the state of  
forest resources...***

Hunger and poverty reduction

Climate change adaptation & mitigation

International reporting

Global FRA

REDD+

UNFCCC

CBD

UNCCD

UNFF



# Open Foris Initiative

## Vision and Mission

***Develop and support  
open source, freely available software tools  
empowering countries and institutions  
in forest monitoring, assessment and reporting.***



# Open Foris

## Tool Development and Support

*Main FAO projects involved so far:*

- **Forest Monitoring and Assessment (NFMA)**
- **BMU-ICI FAO-INPE REDD+ Project**
- **UN-REDD Programme**
- **Global Forest Resources Assessment (FRA)**



Open Foris  
Overview of Software Tools

## Collect

Design inventory databases  
Enter and check field data online/offline

## Collect Earth

Quick, easy visual interpretation in Google Earth

## Collect Mobile

Digitize data offline in the field  
Harmonized data checks

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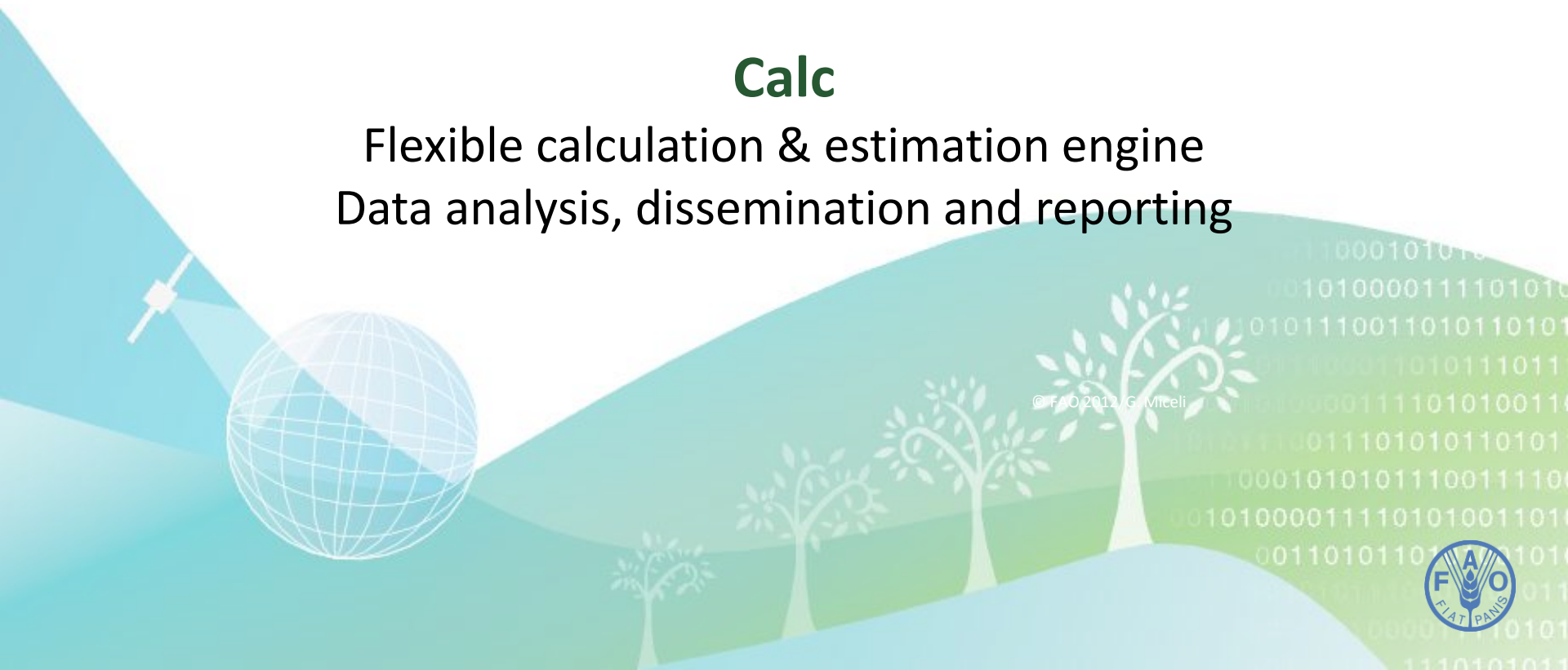
Open Foris  
**Overview of Software Tools**  
(cont.)

## **Geospatial Toolkit**

Advanced geospatial data processing  
RS/GIS capacity building

## **Calc**

Flexible calculation & estimation engine  
Data analysis, dissemination and reporting





The official launch of the  
*Open Foris Initiative*  
is scheduled in October 2014 at the  
IUFRO World Congress



The image shows a screenshot of the IUFRO 2014 World Congress website. The top banner features the IUFRO logo (a stylized tree) and the text "IUFRO 2014 WORLD CONGRESS" and "SUSTAINING FORESTS, SUSTAINING PEOPLE THE ROLE OF RESEARCH". Below this is a navigation bar with links: Travel & Lodging, Scientific Program, Events, Tours & Companion Programs, Scholarships, Exposition & Sponsorship, Media and News, and a prominent green "REGISTRATION" button. The main content area has a large image of a modern building with a glass tower. Overlaid on this image is the text "Save the Date! October 5-11, 2014" and "Pre-Congress Scientific Tours and Post-Congress Sightseeing Tours will be offered!" with a "LEARN MORE" link. To the right, there is a language dropdown menu set to "English", the full name of the organization, and a section titled "Key Dates" with a table of important dates.

**IUFRO**  
2014 WORLD CONGRESS  
SUSTAINING FORESTS, SUSTAINING PEOPLE  
THE ROLE OF RESEARCH

Congress Information Contact

Travel & Lodging Scientific Program Events Tours & Companion Programs Scholarships Exposition & Sponsorship Media and News **REGISTRATION**

English

International Union of Forest Research Organizations  
**XXIV WORLD CONGRESS** | **OCT 5-11 2014**  
Salt Lake City, USA

**Save the Date!**  
**October 5-11, 2014**  
Pre-Congress Scientific Tours and Post-Congress  
Sightseeing Tours will be offered! [LEARN MORE](#)

**Key Dates**

<b>JUNE 2014</b>	05 June 2014 - Last Day to Request a Refund
<b>SEPT 2014</b>	20 September 2014 - Online Registration Closes
<b>OCT 2014</b>	05 October 2014 - Congress Opening Ceremonies Closes

# Open Foris Initiative

## Collect

Technical description







## Objectives & Benefits

- Adjustable to *any* field survey (e.g. NFI socioeconomic, GHG, LULC, water, other resources..)
- *Any variables, classification schemes, sampling designs, etc.*
- Setup and customization done by users
- One tool, many databases = sustainability!
- Customizable data-quality checks



## Objectives & Benefits (cont.)

- Rapid data entry
- Safekeeping of data (in-country or in FAO)
- Multiple concurrent users (online)
- Multiple offline users



OPENFORIS  
COLLECT



## Highly customizable forms and validation rules

**Data Cleansing Cluster 181\_235** Form Version: BP 28.12.2010 - SE 26.12.2010 Application Version: 2.9.1

**Cluster** **Plot** **Key Informant Interview** **Household Surveys**

	11/03/2011	11/03/2011	11/03/2011	11/03/2011
Form checked	LYANGALA, J.M			
Data entered	PAITON, A. KAIJAG			
Data cleaned				

**Region** 010 ☐ Ruvuma  
**District** 001 ☐ Tunduru  
**Crew no.** 5  
**Map sheet(s)** NFM 0223  
**Add**    
**Accessibility** 0 ☐ Accessible  
**Vehicle location** UTM Zone 37S  
**Photo**     
**GPS Y (Northing)** 8715892  
**GPS X (Easting)** 344395  
**GPS model**   
**High precision GPS** Y  
**Direction to 1st plot**  deg  
**Distance to 1st plot**  m  
**Time study**  
**Date** 11/03/2011  
**Start time** 11:30 **End time** 16:15  
**Add**    
**Remarks** the cluster falls on game controlled area as a hunting block for tanzania big game safari company.





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COLLECT



Form definitions



IDs & coordinates



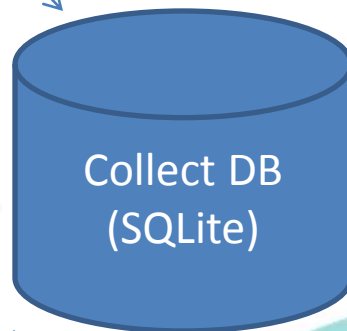
Species checklists



Code lists



PC-based data entry



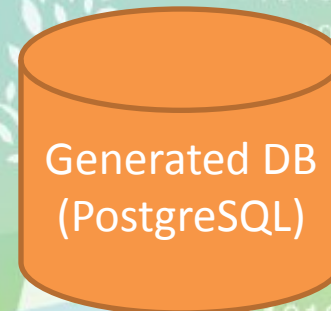
Mobile data entry



Export/backup



Flat files



Relational DBs

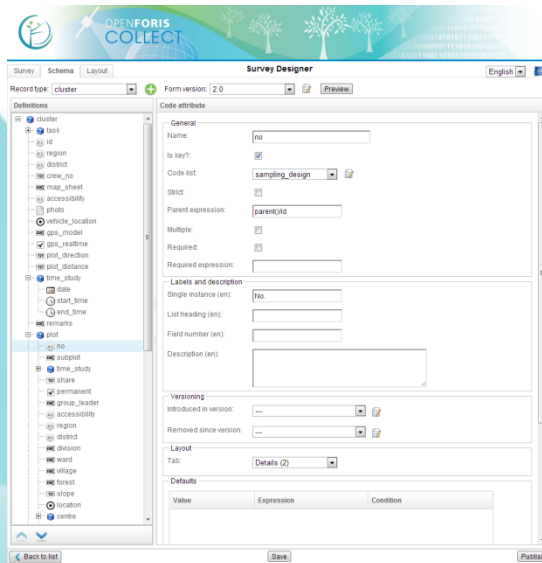


OPENFORIS  
COLLECT



# Open Foris Collect

## Offline data flow



Collect Designer

IDML



Collect Forms  
(Computer A)

Data (XML)

IDML



Collect Forms  
(Computer B)

Data (XML)

IDML



Collect Mobile Forms





# Integrated workflow



- **CLERKS ENTER DATA VERBATIM\***
- **ALL ERRORS FIXED OR “CONFIRMED”**
- **RECORD SUBMITTED FOR CLEANSING**
- **COPY OF UNCLEAN DATA KEPT**

Record ✓

- **EXPERT USER CORRECTS OR REMOVES ALL ERRORS**
- **ALL REQUIRED FIELDS FILLED OR MARKED “APPROVED”**
- **RECORD SUBMITTED FOR ANALYSIS**

Record ✓

- **AVAILABLE FOR CALCULATION & ANALYSIS**
- **RECORDS MARKED READ-ONLY**



\* Does not apply to mobile data collection

## Collect Earth

Technical description



# Open Foris Initiative

## Parts of Collect Earth

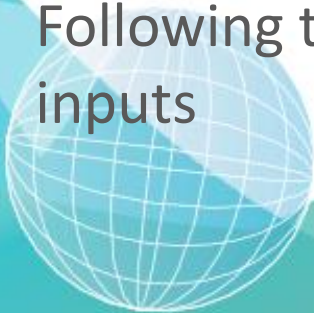
- Programmed in Java
  - Multi-platform (Windows, Mac and Linux)
- Collect Earth Server
  - HTTP Server to communicate with Google Earth
  - Selenium API for integration with Google Earth Engine
- Collect Earth GUI
  - Control & customization of Collect Earth
- Collect framework
  - SQLite/PostgreSQL database
  - Survey manager



# Open Foris Initiative

## Customizing Collect Earth

- CSV file(s) with plot ID and coordinates
  - Aspect, orientation and slope
  - Regional and strata information
- A Collect IDML file describing the survey
  - Defines the survey as an XML file
- HTML form shown when clicking on the plots
  - Following the Collect Earth nomenclature for the HTML inputs



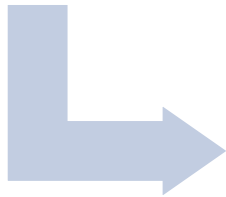


# Open Foris Initiative

## Land Use maps with GEE

Export

- The collected data is exported as a Fusion table containing the classification information.



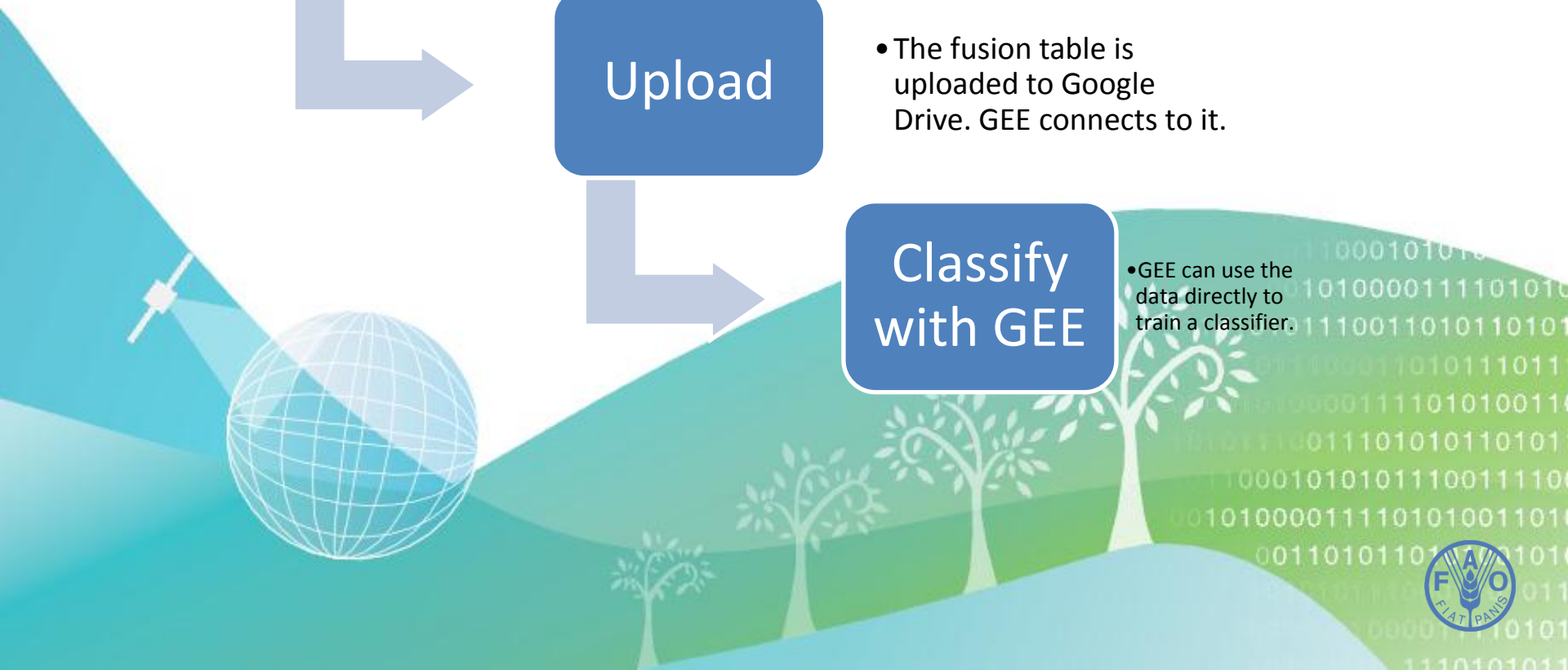
Upload

- The fusion table is uploaded to Google Drive. GEE connects to it.



Classify with GEE

- GEE can use the data directly to train a classifier.





# Open Foris Initiative

## Handling the data

- Data collected is stored in SQLite or PostgreSQL database
- SQLite – embedded database in local computer.
- PostgreSQL – allows multiple-clients to connect to a network database to share the collected data.
- CSV, XML and Fusion export functionality.



# Open Foris Initiative

## Saiku : Analyzing the data

- Completely integrated with Collect.
- Simple and user friendly tool for data analysis.
- Drag & Drop interaction.
- Export results to many formats
- Supports graphics
- Can act as a server



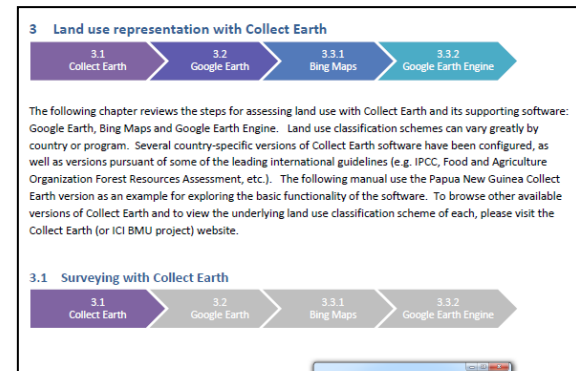
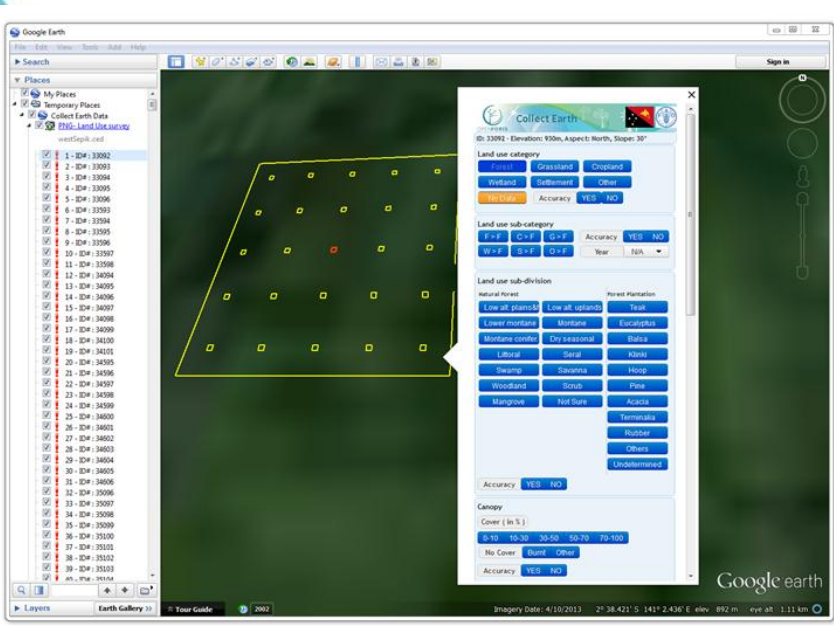
# Open Foris Initiative

- Volume 1

- Project background and policy context
- Land representation and sampling theory
- Reporting to the UNFCCC

- Volume 2

- Collect Earth User manual
- Overview of supporting software  
(Google Earth, Bing Maps, Google Earth Engine, Saiku)
- Step-by-step tutorials (pdf & video)



Use the Collect Earth dialogue box to enter land use information for the plot.

Land use classification schemes vary by country. To facilitate national reporting to the UNFCCC, the country-specific versions of Collect Earth present land use classes through a land representation framework recommended by the IPCC. This framework outlines six main land use categories that more detailed land use sub-divisions will fall within.

Land use sub-categories indicate the conversions from one land use to another. The year of the change is significant for interpreting land use change dynamics and estimating emissions from land use change.

The Land use sub-divisions are more refined land use classes that more closely represent realities within a country or an area of interest.

The Accuracy options allow users to indicate their level of certainty with their selections.

The Canopy options include quantitative and qualitative descriptions of forest canopy cover. The cover percentage can be calculated from the ratio of plot points under canopy cover to the total number of plot sampling points (25). Uncertainty may arise where no high spatial resolution imagery is available for the plot area. If uncertain, select No under the accuracy option.

Collect Earth

ID: 33092 - Elevation: 930m, Aspect: N, Slope: 58°

Land use category

Wetland Grassland Cropland

Settlement Other

No Data Accuracy YES NO

Land use sub-category

T > F C > F G > F W > F S > F Q > F Accuracy YES NO

Year N/A

Land use sub-division

Natural Forest Forest Plantation

Low alt. plains Low alt. uplands Teak

Lower montane Montane Eucalyptus

Montane conifer Dry seasonal Balsa

Libral Seral Maki

Swamp Shamba Hoop

Woodland Scrub Pine

Mangrove Not Tree Acacia

Terminalia

Rubber

Others

Undetermined

Accuracy YES NO

Canopy

Cover (in %)

0-10 10-30 30-50 50-70 70-100

No Cover Bust Other

Accuracy YES NO

Type

Random Sparse Grouped Linear Units

Collect Earth  
Land sampling with free, web-based resources

15

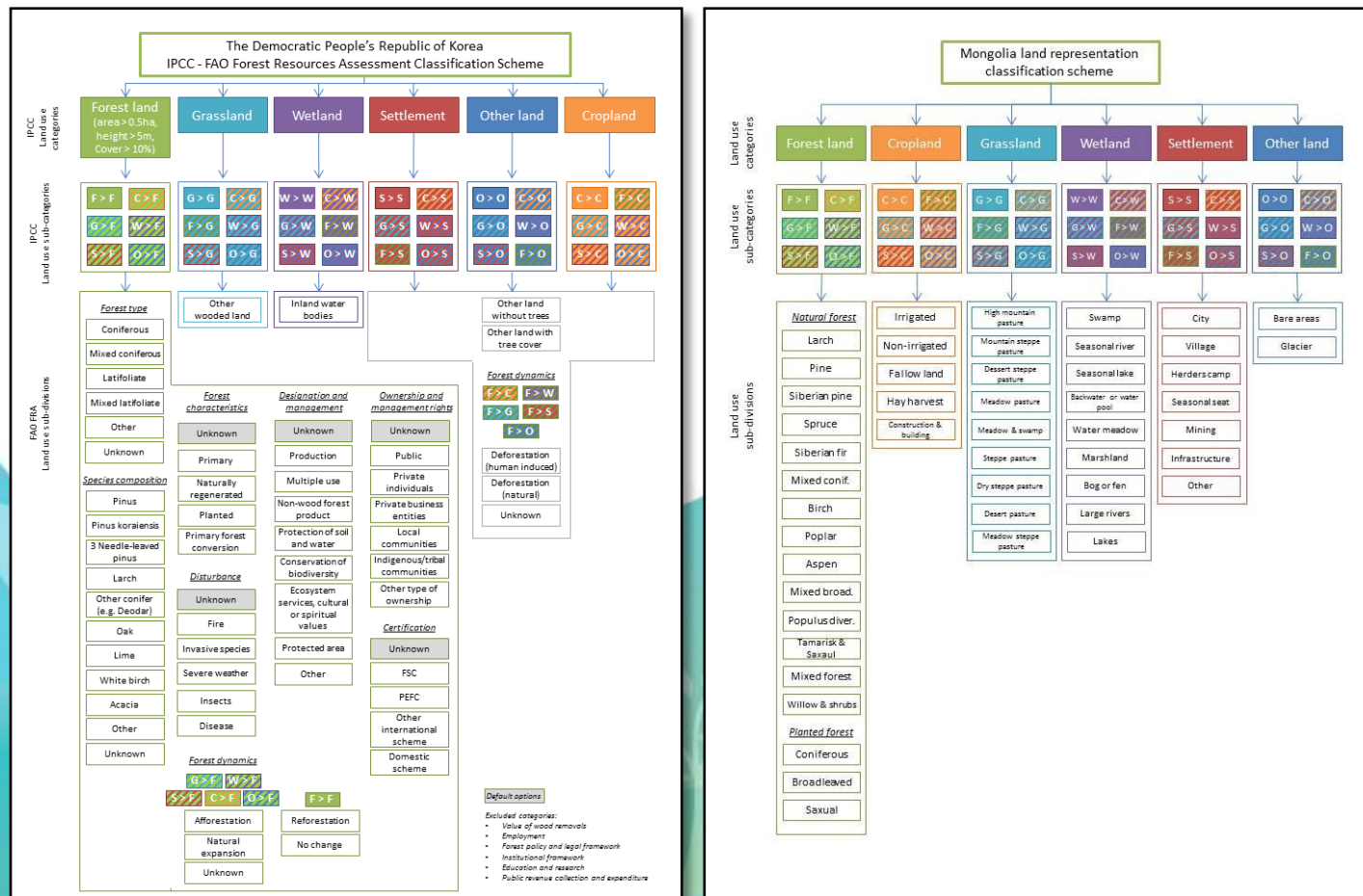
Volume II  
User Manual for Windows Operating System

# Open Foris Initiative

## Collect Earth : Flexibility in land representation

IPCC, FAO FRA, DPR Korea, Mongolia, Papua New Guinea, Tunisia, etc.

18 countries and 5 different international frameworks



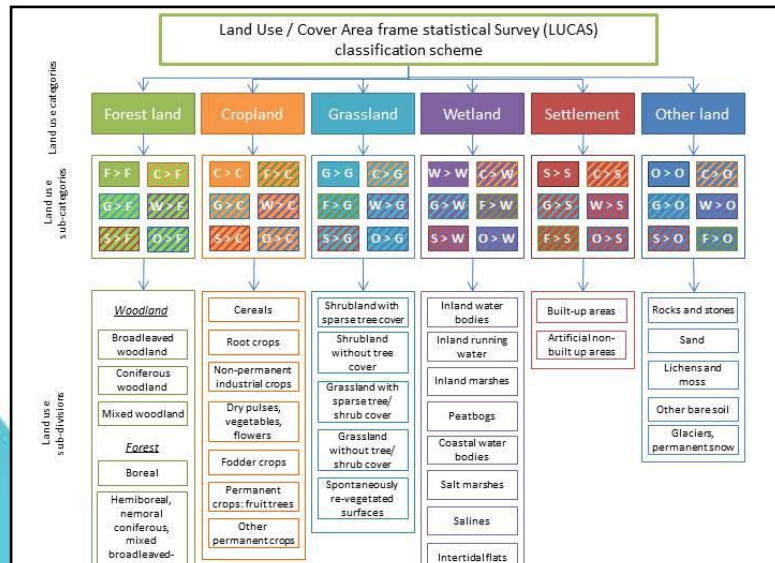


# Open Foris Initiative

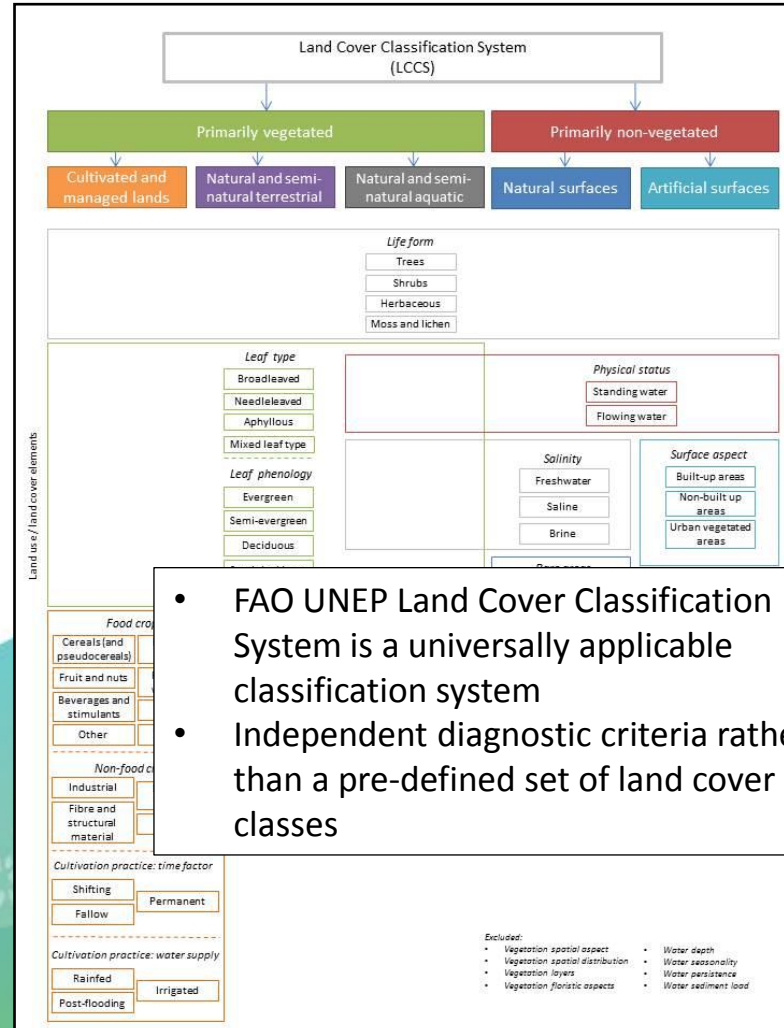
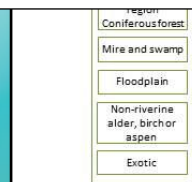
## Collect Earth : Flexibility in land representation

### IPCC LUCAS

### FAO UNEP LCCS



- European Commission EUROSTAT land use, land use change survey
- Conducted every 3 years since 2006
- In-situ observations in 27 EU countries (more than 270,000 points)



- FAO UNEP Land Cover Classification System is a universally applicable classification system
- Independent diagnostic criteria rather than a pre-defined set of land cover classes







## Land cover/use statistics (LUCAS)

### Introduction

#### ▼ Data

##### Database

#### ► Primary data

##### Maps

#### Methodology

#### Publications

#### Links

## Methodology

### • The LUCAS survey

**LUCAS** stands for **Land Use and Cover Area frame Survey**. The aim of the LUCAS survey is to gather **harmonised data on land use/cover and their changes over time**. In addition the survey provides territorial information facilitating the analysis of the interactions between agriculture, environment and countryside.

- LUCAS is an **in-situ survey area frame survey**, which means that the data is gathered through direct observations by the surveyors on the ground. Land cover data can also be obtained by photo interpreting satellite images or orthophotos as is done in the Corine Land Cover.

The land cover/use statistics derived from the LUCAS survey are unique as they are **fully harmonised** (same definitions and methodology) and **comparable** over time and among Member States.

- The land cover and the visible land use are classified according to the harmonized **LUCAS land cover and land use nomenclatures**. The full survey supporting documents consist of field form, where all the measured variables are listed, surveyors' instructions, which give detailed instructions to the field surveyors and of the quality control procedures. The full description of the statistical data set is available in the land cover/use statistics metadata attached to the data.
- The **latest LUCAS survey was carried out at EU level in 2012**. In the 2012 LUCAS survey 270 000 geo-referenced points were visited by 750 field surveyors on the spot. The points were selected from a standard 2 km grid including in total around 1 million points all over the EU. The selection of points is done on the basis of stratification information.
- In Bulgaria and Romania the LUCAS 2012 survey included a **soil module**. As in 2009 a top soil sample was collected on 10 % of the points. The objective of the soil module is to improve the availability of harmonised data on soil parameters in Europe. The LUCAS soil was implemented in co-operation with DG Environment and DG Joint Research Centre. The results will be available in 2014.

## Don't miss

New insight into land cover and land use in Europe - Issue number 33/2008

LUCAS presentation (.ppt)

LUCAS Metadata

LUCAS instructions

LUCAS nomenclatures

LUCAS field form

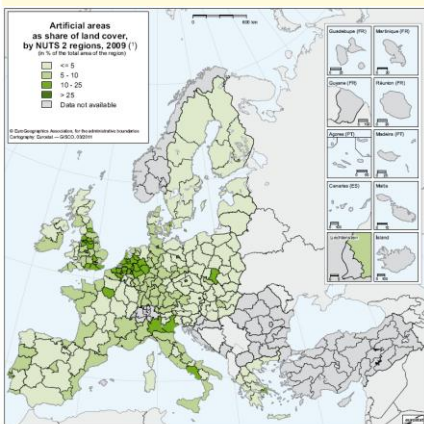
LUCAS sampling strategy

LUCAS Quality Control Procedures

## Links

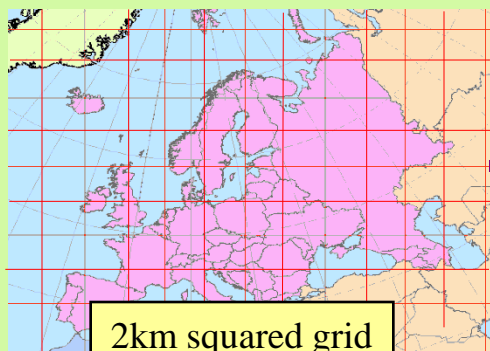
Joint Research Centre: Soil Data Centre

DG Environment

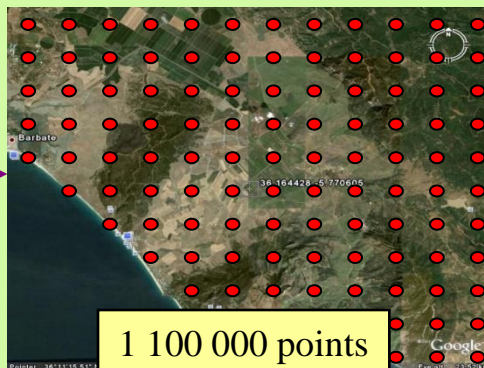


# Sampling strategy: multi-phase sampling design

First phase sample for stratification: orthophoto interpretation



2km squared grid



1 100 000 points

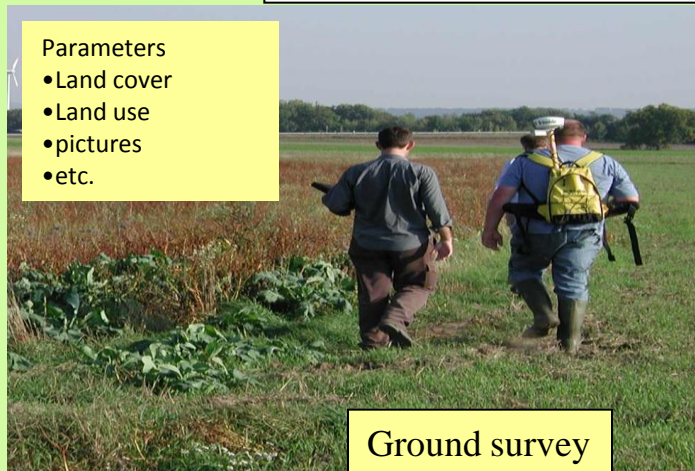
## LAND classes

- 1 ARABLE LAND
- 2 PERMANENT CROPS
- 3 GRASSLAND
- 4 WOODED AREAS AND SHRUBLAND
- 5 BARE LAND, RARE VEGET.
- 6 ARTIFICIAL LAND
- 7 WATER

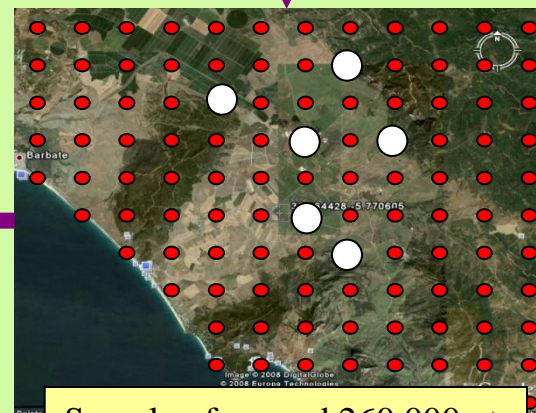
Second phase sample: in-situ data collection

Parameters

- Land cover
- Land use
- pictures
- etc.



Ground survey



Sample of around 260,000 pts



Thank you

